CLAIMS

1. Process for production of a sintered oxide ceramic of composition $Ce_xM_yD_zO_{2-a}$ with dense structure without open porosity or with a predetermined porosity, where a first doping element M is used from at least one element of the group consisting of the rare earths but M ≠ Ce, alkali and earth alkali metals, and a second doping element D of at least one metal but D ≠ M, characterised in that
the educts are used with a second doping element D from at least one metal of the group consisting of Cu, Co, Fe, Ni and Mn, in the submicron particle size or as a salt solution, and sintered at a temperature in the range of 750 - 1250°C into an oxide ceramic with extremely fine structure of a grain size of maximum around 0.5 µm.

2. Process according to claim 1, characterised in that first doping material M is taken from the group La, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu; Ca, Sr, Ba; Sc, Y, Ga.

3. Process according to claim 1 or 2, characterised in that the components are used with mol fractions in the range from $0.5 \leq x \leq 1$ for Ce, $0 \leq y \leq 0.5$ for M, $0 < z \leq 0.05$ for D, the mol fraction for the second doping element D preferably in the range from $0.001 \leq z \leq 0.02$.

4. Process according to any of claims 1 to 3, characterised in that educts are used with a mean grain size in the range of maximum 0.1 µm, preferably 0.01 - 0.05 µm.

5. Process according to any of claims 1 to 4, characterised in that sintering takes place at a

temperature in the range of 800 - 1200°C, in particular 850 to 1100°C.

6. Process according to any of claims 1 to 5, characterised in that sintering takes place with a heating rate in the range of 0.5 - 20, preferably 1 - 10°C/min.

7. Process according to any of claims 1 to 6, characterised in that sintering continues until a density of at least around 98% of the theoretically possible density, preferably at least around 99%, is reached.

8. Process according to any of claims 1 to 7, characterised in that the educts are sintered with a holding time of at least approximately 0.25 h, preferably around 1 - 2 h, at the optimum end temperature.

9. Process according to any of claims 1 to 8, characterised in that educts in the form of oxides are ground wet and/or dry and calcinated.

10. Process according to any of claims 1 to 8, characterised in that the educts are precipitated, filtered and calcinated jointly as inorganic salts.